



A KN 200 seen mounted on an AR-10 derivative sniper weapon

MORE DAY, LESS NIGHT NIGHT VISION SYSTEMS

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Critical to perception of modern infantry capability is that 'every soldier is a sensor'. The ability for individual soldiers to observe, acquire targets and accurately engage targets at night and in poor visibility is critical to current and future operations. Asian Armies have traditionally had comparatively low scales of night fighting equipment. If this continues, Asian land warfare capability may find itself lagging dangerously behind, when it comes to local security and even conventional operations.

Three categories of NV systems are available for dismounted soldiers: weapon sights; helmet- or head-mounted single or dual-tube night vision goggles (NVGs); and, handheld NV devices,

some of which can be mounted on small tripods for extended surveillance missions.

In May 2002 the US Army launched its Omnibus VI project to field new image intensification (I2) systems using new third generation (Gen 3) technol-

ogy. Under the original five-year contract ITT supplied 60% of the ground NV systems, and 100% of the aviation component, while Northrop Grumman supplied the remaining 40% of the ground component.

The AN/PVS-14 (the designation

stands for Army/Navy Portable Visual Search) Monocular Night Vision Device is a lightweight helmet- or head-mounted device which is being fielded to replace the AN/PVS-7D NVG. ITT and Northrop Grumman have produced more than 400,000 units for the US Army alone and the service plans to order another 300,000 over the next five years. The AN/PVS-14 is also used by the other US armed services and by many American allies. The system uses a Gen 3 I2 tube and is designed for use in conjunction with weapon-mounted Multifunctional Aiming Lights (MFAL) such as the AN/PEQ-21, AN/PEQ-15 and AN/PEQ-15A. The user is able to distinguish targets at range up to 150 metres and the MNVDs provides a field of view of about 40 degrees. One AA battery provides about 15 hours of life at moderate temperatures. An adaptor enables the soldier to mount the monocular on weapons fitted with the MIL-STD- 1913 'Picatinny' rail. The AN/PVS-14 weighs .88 pounds. ITT has supplied several thousand AN/PVS-14 units to both the British and Canadian armed forces.

ITT received a five-year contract,



AN/PVS-27 mounted on a 12.7mm Barrett rifle. (PHOTO: OSTI)

potentially worth \$560 million, in April 2005 to produce AN/PSQ-20 Enhanced Night Vision Goggles (ENVGs) to supplement and eventually replace the remaining AN/PVS-7D and the AN/PVS-14 devices. Industry analysts believe that with follow-on contracts the ENVG programme will be among the five largest electro-optical projects in the world over the decade 2005-15. ITT was selected for the ENVG contract after an evaluation by the army's Night Vision and Electronic Sensors Directorate of competing systems in five

different operational scenarios: target detection in an urban terrain environment; target detection in a woodland environment; target detection during a tunnel-clearing exercise with no light; target detection in an open field; and, negotiation of obstacles while wearing the equipment.

The ENVG is a helmet-mounted passive device that combines I2 and thermal imaging (TI), also known as forward-looking infrared (FLIR), technology to produce an image in low-light conditions and through obscurants such as smoke and fog. An I2 device captures ambient light from the stars, moon or manmade 'sky glow' and amplifies this light thousands of times by electronic means to create a phosphor image in NV systems. The advantages of I2 systems are lightweight, small size, low power consumption and low cost. Thermal imagers gather the electro-magnetic radiation emitted as heat by humans, animals, man-made objects and most natural objects to present an electronic image. As TI technology does not rely on ambient light these systems can 'see' in the darkest night as well as through fog, haze and smoke. This advantage comes with a greater price tag than I2 systems. The technology incorporated in the ENVG superimposes a thermal image over an I2 image to create an integrated picture. Future Gen 4 NV systems will digitally fuse the images from the two technologies.

The AN/PSQ-20 is compatible with MFALs. According to the US Army's



The Raytheon family of thermal weapons sights (PHOTO: Raytheon)



The SViper system seen mounted on an 8.6mm L-115A1 (PHOTO: QIOPTIQ)

Project Manager Soldier Equipment a "digital upgrade package for ENVG will take advantage of image processing techniques to improve image clarity and situational awareness for the soldier. A digital system lends itself to the battlefield of the future with the ability to import and export digital files (data/map injection)."

The AN/PAS-13 Thermal Weapon Sight family mounts on individual and crew-served weapons enabling soldiers to engage targets "to the maximum effective range of the weapon" according to PM Soldier Equipment. Following a US Army request in 2004 to ramp up production of the TWS I Raytheon expanded its Dallas, Texas, integration facility to boost the monthly production from 400 units to more than 1,000 and invested in improving

the production facilities of several of its subcontractors. The following August the company delivered its 25,000th AN/PAS-13 sight to the service.

In March 2004 the US Army Communications-Electronics Command awarded a base contract for the development and production of uncooled AN/PAS-13D TWS II sights to DRS Optronics of Palm Bay, Florida, worth \$118 million and rising to \$375 million plus with options. Additional production worth more than \$140 million have since been awarded to DRS. A second source contract worth \$111 million, and potentially more than \$250 million, was given to BAE Systems of Nashua, New Hampshire to produce AN/PAS-13C TWS II sights. BAE Systems has delivered more than 12,000 sights to date. Kobin Corporation supplies its

CyberDisplay 640M, which provides a 640x480-pixel liquid crystal display, to both companies. In July 2007 the army awarded Raytheon Network Centric Systems an indefinite delivery-indefinite quantity contract potentially worth \$2.6 billion to supply 150,000 TWS II sights over a five-year period. The initial \$60 million delivery order covers approximately 5,000 sights for delivery from December 2007.

The TWS II is produced in three configurations: the Light Weapon Thermal Sight (LWTS) which is mounted on the 5.56 mm M4 carbine/M16 rifle series and the M136 light antiarmour weapon; the Medium Weapon Thermal Sight (MWTS) designed for use with the 5.56 mm M249 Squad Automatic Weapon and 7.62 mm M240B medium machine gun; and, the Heavy Weapon

Thermal Sight (HWTS) designed for use by squad leaders equipped with the M4/M16, snipers and support weapons crews armed with the .50 calibre M2HB heavy machine gun or 40 mm Mk 19 Mod 3 automatic crew launcher. The user can recognise a human at 500 m using the 1.95 pounds LTWS, 1.2 km using the 2.9 pounds MTWS and 3.7 pounds using the 2.5 kg HTWS. The user can detect a vehicle at 4.2 km using the normal field of view on the MWTS while the HTWS can detect a vehicle at 6.9 km. Using the wide field of view these ranges are reduced to 1.5 km and 2.8km respectively.

US Army and USSOCOM snipers equipped with the 7.62mm M24 Sniper Weapon System are issued the Northrop Grumman AN/PVS-10 Night-Vision Sniper Night Sight (SNS) which can be used by day or night simply by flicking switch. The passive I2 scope enables snipers to engage targets at a range of 800 metres by day and

600 metres by night. Northrop Grumman offers the AN/PVS-10 with 8.5X and 12.2X magnification; the former weighs 2.2 kg and the latter 2.5 kg. The sight is powered by two AA batteries

In December 2006 the Marine Corps Systems Command awarded Optical Systems Technology Inc (OSTI) a five year indefinite-delivery/indefinite-quantity contract that could eventually be worth \$40 million to supply 4,700 Magnum Universal Night Sight (MUNS) to meet the Scout Sniper Mid-Range Night Sight requirement. The initial delivery order of 841 sights is scheduled for completion by December 2007. The 3.2 pounds MUNS clips onto day sights without requiring tools and enables a soldier to detect a human at more than 1.3 km in starlight conditions and a vehicle at about 3.1 km. The 3.2 pound sight is powered by 2 AA batteries which provide over 60 hours of use in optimum conditions. The MUNS is already used by Cana-

dian and UK special forces.

In October 2007 FLIR Systems received a \$48 million contract to supply its new lightweight Recon III LocatIR TI binoculars to meet the USSOCOM's Hand Held Imaging-Long Range (HHI-LR) requirement. The Recon III uses both a long-wave, uncooled imager and high-sensitivity, mid-wave InSb sensor for long-range viewing. Features include a picture-over-picture capability for situational awareness, digital zoom, a laser pointer, a digital magnetic compass and a GPS link. The Recon III ObservIR binoculars provide the full functionality of the LocatIR less the geo-location capabilities.

UK DEVELOPMENTS

The UK's Qioptiq, formed in 2005 when Candover Investments acquired Thales High Tech Optics, is one of Europe's leading optronics companies and produces a wide range of weapon sights, NVGs and other NV equipment at plants in Europe and overseas.



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- The Kite I2 weapon sight was developed to meet the needs of the British Army and now in service in more than 50 countries. Intended for use on short and medium range weapons the Kite weighs 990g, excluding its two AA batteries, and provides 4X magnification enabling the user to recognise a standing man at 500 m in starlight conditions.

- The MaxiKite-2 is designed for longer range weapons such as 7.62 mm and .50 calibre machine guns; 6X magnification enables recognition of a standing man at 750 m in starlight. The sight weighs 1.36 kg and is powered by two AA batteries which provide up to 70 hours of life.

- The 1X Sniperkite I2 sight is optimised for use with the Schmidt & Bender range of day sights and although it is compatible with 'most' other rifle scopes. Two AA batteries provide up to 100 hours of continuous use. Weighing less than 1.5 kg the 250 mm long Sniperkite is mounted on a Picatinny rail in front to the day scope.

- The 3X Vipir TI sight is intended for use on 5.56 mm weapons enabling the user to acquire a man at ranges of 400 to 600 m. Four AA batteries provide six hours of use at moderate temperatures.

- The Vipir-2 TI sight is intended for use on 5.56 mm, 7.62 mm and .50 calibre weapons. It is available with a 9° field of view 2.7X magnification or a 6.5° field of view 3.6X magnification. The Vipir-2 enables the user to detect a man at ranges up to 1200 m.

In January 2007 Qioptiq UK received a contract from the UK Ministry of Defence to supply over 450 Vipir-2s with additional orders expected to follow. The next month Thales Australia, acting as prime contractor to the Australian Defence Forces, awarded Qioptiq a contract to supply the Vipir-2, spares and support for the Australian Army's Land 125 Soldier Enhancement Programme. The Vipir-2 will also be used for the UK's Future Integrated Soldier Technology (FIST) programme which will be fielded incrementally. Thales, which is the prime contrac-



While highly capable, ENG is probably cost prohibitive to all but the US Army.

tor for the FIST project, and the army have identified the need for every soldier in the basic four-man fire team to be equipped with NVGs. In addition the team commander and grenadier will be equipped with day and night sights, the 5.56 mm L86A2 Light Support Weapon gunner with a 'long range night sight' and the operator of the 5.56 mm Minimi light machine gun with a TI sight. Although the FIST assessment phase had demonstrated that some planned technologies, such as C4I systems, are too immature to

be fielded it clearly demonstrated that new surveillance and target acquisition technology offers significant benefits.

At the DSEi defence exhibition in London in September 2007 Qioptiq UK launched the new SVipir-2+. The sight has been designed to allow snipers to retain the capability of their existing optical day sight. According to the company the SVipir-2+ can easily be integrated with a wide range of sniper rifles and day scopes.

The Land & Joint Systems division

of Thales continues to produce several NV systems for dismounted applications. The Lightweight Universal Night Observation System (LUNOS) family consists of a common body, several high speed objectives with different magnification factors (1X, 4X and 6X) and a number of options, such as face mask, grip, monopod and reticle for 6X. The accessories enable the LUNOS to be configured as lightweight binocular 1X magnification NVGs and reconfigured as a long range, tripod mounted 6X surveillance device in only one minute. The MUNOS (Multiple Use Night Observation and Aiming Sights) family is based on the same modular approach. The common Tube Module with standard I2 tube can be used with the short range 4X WS4, medium range 6X WS6 or long range 10X WS 10 Body Module.

EUROPE

Thales Land & Joint Systems Division has sold more than 6,000 Sophie handheld TI binoculars to military, paramilitary and public service agencies in more than 45 countries. Since January 2005 Thales has produced over 600 Sophie imagers for use by the French army, air force and navy. Sophie weighs 2.4 kg and can be mounted on a tripod for extended surveillance mis-

sions. The user can detect a human at more than 5 km and a vehicle at more than 10 km. The Sophie MF (Multi-Function) combines the features of the Sophie with an eye-safe laser range-finder, a GPS, a direction finder and a laser pointing system. The system weighs less than 3.5 kg.

Sagem is the prime contractor for the €96 million project to deliver 31,600 FELIN (Fantassin à Equipement et Liaisons INTégrées) soldier systems to the French Army; FELIN V1 (for Version 1) is scheduled to be fielded in 2007-10 and FELIN V2 about 2015. Both day and night optronics are among the systems that will be fielded with FELIN V1. Sagem is providing its Clara Mono NVG that can be fitted with SuperGen, Gen 3 or XD-5 I2 tubes. An adapter allows the Clara Mono to be mounted as a weapon sight and it can be fitted with 4X magnifier.

The German Army has selected the AIM HuntIR TI sight for its Infanterist der Zukunft (IdZ; Infantryman of the Future) programme. The 2.5 kg HuntIR allows the user to detect a man at ranges up to 1,500 m. Already in German service the sight can be mounted on the 5.56 mm G36 assault rifle, the 5.56 mm MG4 LMG, the 7.62 mm sniper rifles and the .50 calibre G82 sniper rifle.



Simrad's night vision goggles can be helmet of head mounted.(PHOTO: Simrad)

Norway's Simrad Optronics develops and produces both night sights and NVGs. The KN200 and KN250 I2 sights are designed to clip on to telescopic sights, laser rangefinders and other daylight optical devices to provide a night vision capability. The KN200 weighs 1.56 kg and provides a 10 degree field of view while the 1 kg KN250 provides a 12 degree field. Both are powered by two AA batteries which provide more than 80 hours of usage. The USSOCOM has purchased both sights for use on sniper rifles and the Norwegian Army has bought over 600 KN200s for use on its sniper rifles. The KDN250 combines 3.5X magnification binoculars with a KN250 sight to produce night and day observation binoculars. Should the user require the KN250 unit can be removed for use as a night sight. Simrad's GN series NVGs can be worn on a head or helmet mount and can be flipped up when the user does not require them. The NVG weighs 390g, including two AA batteries, and the head mount weighs 230g.

Night vision systems are no longer a "nice to have". They are an essential part of operational equipment and may require more thought and investment than weapons.



Thermal weapons sights mounted on a 12.7mm sniper rifle and M4 Carbine.